

**A SUMMER-FALL ECOLOGICAL RECONNAISSANCE  
OF THE BIG CYPRESS BAYOU WATERSHED,  
TEXAS AND LOUISIANA**

**Prepared by: William J. Sheffield, Ph.D.**

Texas Parks and Wildlife Department  
4200 Smith School Road  
Austin, Texas 78744



In cooperation with and funded by:

Department of the Army  
Fort Worth District - U.S. Army Corps of Engineers  
Post Office Box 17300  
Fort Worth, Texas 76102-0300

**August 1995**

. ...many of the diverse wildernesses  
out of which we have hammered America are gone.

No living man will see again the long-grass prairie,  
where a sea of prairie flowers  
lapped at the stirrups of the pioneer.

No living man will see again  
the virgin pineries of the Lake States  
or the flatwoods of the Coastal Plain,  
or the giant hardwoods;

of these, samples of a few acres each will  
have to suffice...

Aldo Leopold (**1949**)



"A sample of the past." Harrison Bavou, Harrison County Texas

# TABLE OF CONTENTS

	<u>Page</u>
<b>EXECUTIVE SUMMARY</b> .....	vii
<b>ACKNOWLEDGEMENTS</b> .....	x
LIST OF TABLES .....	xi
LIST OF FIGURES .....	xii
<b>PREFACE</b> .....	xvi
<b>RECONNAISSANCE AREA</b> .....	I
OBJECTIVES 4	
PROCEDURES 5	
Literature Review .....	5
c o v e r Classification .....	5
Maps and Aerial Photographs .....	5
Physical and Biological Information .....	6
Ecological Reconnaissance .....	7
Land and Cover Classification .....	8
Mapping .....	8
Information Management .....	11
<b>FINDINGS AND DISCUSSION</b> .....	12
Watershed Cover Types .....	12
Waterbodies and Their Perimeters .....	17
<u>Streams</u> .....	18
<u>Reservoirs, lakes and ponds</u> .....	23
<u>Swamps</u> .....	24
<u>Marshes</u> .....	27
Floodplains .....	30
<u>Bottomland hardwood forests</u> .....	30
<u>Shrub-dominated floodplain</u> .....	34
Terraces and Uplands .....	35
<u>Unmanaged pine-hardwood forests</u> .....	35
<u>Unmanaged hardwood forests</u> .....	37
<u>Managed pine forests</u> .....	37
<u>Shrub-dominated terraces and uplands</u> .....	40
Grasslands .....	42
Cropland .....	45
Developed and Disturbed Land .....	47
<u>Urban suburban and industrial sites</u> .....	51
<u>Bare ground</u> .....	51

## TABLE OF CONTENTS (continued)

	<u>Page</u>
Special Attention Plant Communities .....	49
<u>Bald cypress swamp</u> .....	49
<u>Bald cypress-water tupelo swamp</u> .....	49
<u>Water oak-willow oak bottomland</u> .....	49
<u>Shortleaf pine-oak upland</u> .....	52
<u>Bluejack oak-wst oak upland</u> .....	52
Unique Plant Communities Within Cover Types .....	53
<u>Bamboo-sweetgum</u> .....	53
<u>Smooth alder swamp</u> .....	53
CONSIDERATIONS .....	55
Ecological Considerations and Land Use .....	55
Socio-Economics and Traditional Land Use .....	60
REFERENCES .....	66
APPENDICES .....	75
A. Memorandum of Agreement Between Texas Parks and Wildlife Department and U.S. Army Corps of Engineers. ....	A-1
B. Survey Point Locations. Big Cypress Bayou Watershed Ecological Reconnaissance, June - October, 1994. B -	1
C. Satellite Imagery Map of the Big Cypress Bayou Watershed Based on 1994 Ground Truthing. Big Cypress Bayou Watershed Reconnaissance, June - July, 1994. C-1	C-1
D. Big Cypress Bayou Ecological Reconnaissance Field Data Form. D -	1
E. Statistical Tests and Testing Rational for Assignment of Wildlife Habitat Value (WHV) and Ecological Quality Rankings (EQR) to Select Cover Types. Big Cypress Bayou Watershed Ecological Reconnaissance, June - October, 1994. E -	1
F. Plants and Animals Listed in Literature Reviewed as Occurring in the Big Cypress Bayou Watershed, and Those Found to Characterize the Cover Types. Ecological Reconnaissance, June - October, 1994. F-1	F-1
G. Natural Plant Communities in the Big Cypress Bayou Watershed Listed by Texas Parks and Wildlife Department as Requiring Special Attention. G -	1
H. Plants and Animals that Occur in the Big Cypress Bayou Watershed Listed by the Texas Parks and Wildlife Department and/or U.S. Fish and Wildlife Service as Rare, Threatened, and Endangered. H -	1

## EXECUTIVE SUMMARY

A June - October, 1994 ecological **reconnaissance** was made of the Big Cypress Bayou Watershed by the Texas Parks and Wildlife Department. Four thousand square miles (67%) of the Watershed was traversed. The **reconnaissance area** included that part of the Watershed in Caddo Parish, Louisiana and Miller County, Arkansas, west to its **headwaters** in Hopkins, Wood, and Franklin Counties, Texas. Major land and cover types were identified, located geographically, and characterized ecologically. The purpose was to facilitate U.S. Army Corps of Engineers cover mapping and provide ecological information for a comprehensive data base which is being prepared. The data will aid long-range **natural** resource and socio-economic planning.

Five land types, 18 cover types, 2 sub-types, 5 plant communities that are declining and in need of special attention, and 2 **unique** plant communities were encountered. Pine-hardwood forests, grasslands, and **bottomland** hardwood forests (including shrub-dominated **bottomlands**) cover 30%, 25%, and 17% of the reconnaissance area, respectively. Shrub-dominated uplands cover 9% of the area, managed pine forests 8%, upland hardwood forests 4%, waterbodies 3%, and **croplands** 2%. The remaining 2% includes developments, surfaced roads, bare ground, and areas not **identified**. Watershed wetlands (waterbodies and **bottomland** hardwood forests), unmanaged pine-hardwood forests, shrub-dominated upland, old fields, managed pine forests, pine plantations, and pastures and hay fields **were** principal cover types compared **in** order to help understand their ecological roles. Vegetation structural diversity, plant and animal species richness, and wildlife habitat value (WHV) assessments provided **an** ecological quality ranking (EQR) for each type. The EQR ranking of cover types is in **the** order listed above. WHV was a subjective assessment. Plant structural diversity and species richness statistically explained 86% of the ecological variability **among** types. Vegetation **diversity** received **strong** emphasis. The more structurally diverse and rich **in** species the vegetation, the greater the number of animal species found. Waterbodies, hardwood forests, and pine-hardwood uplands are Watershed **cover** types found to be more diverse and

rich in species. Diversity and richness of pine forests and merchantable-age plantations depended on their age and management. Cumulatively, they are less diverse and less rich in species than the other forests. Disturbed land with natural vegetation and young planted pine up to 15 ft. tall was classed as **shrub-**dominated uplands. Those **shrublands** lack vegetation structural diversity but they are rich in plant species, and are used by numerous **animals**. Pastures and hay fields are lowest in diversity and richness of the vegetated lands. Old fields are intermediate in richness among **all** cover **types** and are more diverse than the **other** grasslands.

Certain small sub-types may have the highest natural productivity. Marshes were judged to be among **the** most productive. Beavers have created most of the small marshes observed. **Benefits** provided by beavers should be evaluated thoroughly and weighed **against** their damaging actions.

Thirty-one percent and 32% of the plant and animal species, respectively, found in lists for the Watershed, were encountered **during** summer-fall. Signs of the **river** otter, a unique mammal on the Texas Parks and Wildlife Department's Watch List for possible decline in number, was recorded on two occasions. Several species of birds that are declining were observed. Of nine special attention plant communities listed for the Watershed, bald **cypress** swamp, bald cypress-water tupelo swamp, water **oak-**willow oak **bottomland**, **shortleaf** pine-oak upland, and **bluejack** oak-post oak upland communities were encountered. Unique plant communities encountered were **bamboo-sweetgum** and smooth alder stands.

**The reconnaissance** enabled a seasonal ecological characterization of the Watershed and assessment of the condition and ecological role of major cover types. Too few observations could be made **within** **the** constraints of **this** work for assessment of **all** types and communities. This was the case particularly with aquatic habitats, upland hardwood forests, special attention plant communities, and zones of interface between types (edge). Additional sampling done seasonally throughout one or more annual cycles is needed for more thorough assessments and to strengthen the reliability of **findings**.

Socio-economic initiatives commensurate with protection of the natural quality are prescribed for the Watershed. Cultural, educational, and recreational pursuits are under consideration. Ecotourism is touted. Most of the rural Watershed, however, must rely on conservation measures and efficient land management enterprises to protect the natural quality and bolster the economy. Considerations suggested to accomplish these needs are:

- ◆ abrogate illegal solid waste dumping and effluent discharges into Watershed streams.
- ◆ accomplish diversified cover restoration on lignite mine sites. Evaluate the development of commercial native plant nurseries on reconstituted sites as a means to mitigate the ecological degradation, generate income, and create jobs. Consider mine operator, landowner, lessee, or cooperative nursery enterprises.
- ◆ accomplish restoration of native plant cover on abandoned iron ore mine sites
- ◆ support current efforts to secure tax advantages for conservation and wildlife management, as is done for other agricultural enterprises.
- ◆ implement multiple use management on rangelands to increase land use efficiency and income. Combinations of lease hunting, cattle grazing, and forestry may be applicable. Include management to increase the quality and quantity of rangeland forage. Consider hunting income options that provide the most revenue.
- ◆ encourage the restoration, or leaving, of native cover strips and patches on mine sites, large grasslands, and clearcuts.
- ◆ expand current reservoir water release management planning so as to minimize bank erosion down-stream, and optimize protection of all native plants and animals that inhabit stream flood zones.
- ◆ help provide long-range protection of the Watershed's natural qualities via a cooperative watershed-tide environmental monitoring program. A consortium of public officials, natural resource agencies, municipalities, educational institutions, students, student mentors, companies, organizations, and individuals could conduct monitoring and accomplish hands-on citizen participation.

## ACKNOWLEDGEMENTS

Most Americans understand the benefits derived ~~from~~ economic development better ~~than the~~ benefits ~~from~~ healthy natural ~~environments~~. The truth is that both are needed for the good quality of life often ascribed ~~only~~ to development. Provisions for ~~both~~ were called for in the 1993 Cypress Bayou Watershed proposal by U.S. ~~Congressman~~ Jim Chapman and Texas Parks and ~~Wildlife~~ Department. The proposal calls for developmental and environmental initiatives together and is exemplary for the Nation. Congressman Chapman, State and federal entities, local municipalities and organizations, and private citizens who supported the effort are hereby congratulated.

The ecological ~~reconnaissance~~ presented herein was one of several studies planned to provide baseline information for the Watershed initiatives. Many individuals helped and ~~their~~ time, support, and specific inputs are sincerely appreciated.

### TEXAS PARKS AND WILDLIFE DEPARTMENT

#### Administrative Support

James A. Neal  
Karen A. Leslie  
Susan E. Carroll  
Larry D. ~~McKinney~~, Ph.D.  
Steve ~~Luttrell~~

#### Field Support

James A. Neal  
Thomas E. Pritchard  
~~Shirley~~ Lee Cage  
~~Audie R.~~ Irvin

#### Document Preparation

Susan E. Carroll  
William J. ~~Sheffield~~, Ph.D.  
Gwen K. Beasley

#### Data Management

James A. Neal  
Susan E. Carroll  
Raymond C. ~~Telfair~~ II, Ph.D.  
~~Matthew~~ C. Mays

#### Report Review

James A. Neal  
~~Susan~~ E. Carroll  
Karen A. Leslie  
~~Carl D.~~ Frentress  
Raymond C. ~~Telfair~~ II, Ph.D.

Mary M. Parker  
Matthew C. Mays  
Gwen K. Beasley

#### Field Investigations

~~Carl D.~~ Frentress  
Raymond C. ~~Telfair~~ II, Ph.D.  
Mary M. Parker  
Michael J. Ryan  
Robert ~~Ramirez~~  
Marvin Rhodes  
Charlie Muller  
Kile Fitch, Jr.  
~~Delanne~~ E. Pruitt  
Matthew C. Mays

#### Design and Layout

~~Susan~~ E. Carroll

#### Photographs

William J. ~~Sheffield~~, Ph.D.

### ADDITIONAL SUPPORT

Thomas J. Cloud, Jr., U.S. Fish and Wildlife Service  
Mary J. Flores, U.S. Army Corps of Engineers  
G. ~~Ishmael~~ Williams, Jr., U.S. Army Corps of Engineers

## LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Closest match of descriptors among <b>five</b> cover classifications applicable to the Big Cypress Bayou Watershed.	9
2. Land and cover types. Big <b>Cypress</b> Bayou Watershed ecological reconnaissance, June-October, 1994.	11
3. Wildlife habitat <b>value</b> rank ( <b>WHV</b> ) and ecological quality <b>rank</b> ( <b>EQR</b> ) of eight major cover <b>types</b> based on five ecological measures. Big <b>Cypress</b> Bayou Watershed ecological <b>reconnaissance</b> , June-October, 1994. 1	3
4. Two-way analysis of variance <b>performed</b> on eight cover types across five ecological measures, and a Duncan's least significance between type means.	14
5. Approximate acreages and percent of <b>the</b> ecological reconnaissance area in major <b>cover</b> types. Big Cypress Bayou Watershed, June-October, 1994.	17
6. Forage yield indices for range site types, Big Cypress Bayou Watershed, <b>Texas and Louisiana</b> . . . . .	33
7. Forage use indices for white-tailed deer and cattle on Big Cypress Bayou Watershed <b>rangeland</b> .	33
8. A representative Cypress Bayou Watershed range, estimated forage yield, optimum cattle and deer stacking, and <b>annual</b> net revenues possible..	62
9. Assessment and ranking of <b>acorns</b> as forage for white-tailed deer. Big Cypress Bayou Watershed.	64

## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Location of Big Cypress Bayou Watershed.	1
2. Orientation of eight <b>cover types</b> based on their plant <b>structural</b> diversity and species richness. Big Cypress Bayou Watershed <b>ecological reconnaissance</b> , June-October, 1994.	14
3. Number of plant and <b>animal</b> species observed during summer-fall vs. the number listed <b>in</b> literature reviewed. Big <b>Cypress</b> Bayou Watershed ecological reconnaissance, 1994.. 1	6
4. Number of plant and <b>animal</b> species observed by cover types. Big Cypress Bayou Watershed ecological <b>reconnaissance</b> , June - October, 1994 1	6
5. Narrow channel and floodplain of upper Little Cypress Bayou, <b>Wood County, TX.</b> .....	19
6. Dry <b>headwater</b> channel of Lilly Creek, <b>Upshur County, TX.</b> House garbage and <b>other solid waste</b> is commonly found at road/stream crossings...	19
7. Texas Parks and Wildlife Department biologists seining <b>shallow</b> , intermittent pools. Upper Harrison Bayou, Harrison County, TX. 2	0
8. Section of Harrison Bayou, Harrison County, TX with little <b>or</b> no <b>summer</b> water flow. Harrison Bayou, Harrison County, TX. 20	20
9. Down-stream reach of Big <b>Cypress</b> Bayou east of Jefferson, <b>Marion County, TX.</b> .....	21
10. Bank erosion <b>on</b> Big Cypress Bayou immediately below <b>Lake O' The Pines dam, Marion County, TX.</b> .....	22
11. <b>Caddo</b> Lake, Clinton Lake component, Marion County, TX. 24	24
12. <b>Shrub</b> edge between timbered <b>bottomland</b> and open water. Big Cypress Bayou floodplain, Camp County, TX. 25	25
13. Intermittently watered <b>shrub</b> swamp (background) within the <b>Caddo</b> Lake complex, Marion County, TX. 25	25
14. Shrub swamp created by beaver damming on James Bayou floodplain, <b>Cass County, TX.</b> .....	26
15. Alder-dominated shrub swamp associated with a branch of Mill Creek, <b>Cass County, TX.</b> .....	27

## LIST OF FIGURES (continued)

<u>Figure</u>	<u>Page</u>
16. Marsh created by beaver damming on a branch of Black Bayou, Miller County, AR. ....	28
17. Marshy edge on Lake O' The Pines, Marion County, TX. ....	28
18. Large marsh associated with Black Bayou east of Oil City, Caddo Parish, LA. ....	29
19. Percent vegetation cover on <b>bottomland</b> hardwood forest observed June-October, 1994, Big Cypress Bayou Watershed..	30
20. <b>Bottomland</b> hardwood forest on a <b>narrow</b> floodplain of upper Little Cypress Bayou, Franklin County, TX.	32
21. <b>Bottomland</b> hardwood forest on a broad floodplain <b>within</b> the Caddo Lake complex, Marion County, TX.	32
22. Shrub-dominated floodplain in Marion County, TX. The site was cleared for pasture and not maintained. Shrub <b>regrowth</b> is <b>predominately buttonbush</b> . ....	34
23. Heavily <b>cutover</b> , unmanaged pine-hardwood upland. Cass County, TX. 3	5
24. Unmanaged pine-hardwood forest-loblolly pine dominant. Hopkins County, TX. ....	36
25. Percent vegetation cover on unmanaged pine-hardwood forest observed June-October, 1994, Big Cypress Bayou Watershed.	36
26. Naturally regenerated loblolly pine forest under management. Harrison County, TX. ....	38
27. Young merchantable age loblolly pine plantation. Morris County, TX. 3	8
28. Managed <b>shortleaf pine</b> on dry upland. Morris County, TX. 3	9
29. Percent vegetation cover on managed pine forests observed June - October, 1994. Big Cypress Bayou Watershed. 3	9
30. <b>Shrub</b> regeneration on a large <b>clearcut</b> pine-hardwood upland, Caddo Parish, LA. 4	0

## LIST OF FIGURES (continued)

<u>Figure</u>	<u>Page</u>
31. Sub-merchantable age loblolly pine plantation classed as shrub-dominated upland. Big Cypress Bayou Watershed ecological reconnaissance. Upshur County TX. ....	41
32. Shrub-dominated upland (clearcut and burned). Upshur County, TX.	41
33. Large irrigated hay field. Camp County, TX.	43
34. Lignite mining, Titus County, TX. Originally pine-hardwood upland forest, this land is being reconstituted and planted in non-native grasses.	43
35. Old field on pine-hardwood upland, Cass County, TX Note the encroachment of pine seedlings.	44
36. Percent vegetation cover on old fields observed June - October, 1994, Big Cypress Bayou Watershed.	45
37. Golf course near Longview, TX. A type of urban-suburban area used by a variety of wildlife. ....	4 8
38. Large iron ore mine site, Morris County, TX. ....	4 8
39. Typical permanently watered bald cypress swamp. Caddo Lake complex, Marion County, TX. ....	50
40. Emergent, aquatic vegetation-choked opening in bald cypress swamp. Caddo Lake complex, Marion County, TX.	50
41. Beaver lodge on Clinton Lake component of Caddo Lake, Marion County, TX.	51
42. Bald cypress-water tupelo swamp community on James Bayou, Caddo Parish, LA.	51
43. Water oak-willow oak bottomland hardwood community, Big Cypress Bayou floodplain, Upshur County, TX	52
44. Shortleaf pine-oak community, Camp County, TX.	53
45. Unique bamboo-sweetgum community, Camp County, TX.	54
46. Shrub-herb covered drainage that provides a protective corridor and edge habitat for wildlife, Gregg County, TX.	57

## LIST OF FIGURES (continued)

<u>Figure</u>	<u>Page</u>
47. Unmowed shrub-herb site, hay meadow, and pine-hardwood forest (background) that provide cover patchiness and edge diversity highly beneficial to wildlife. ....	57
48. Low-quality edge associated with some development.	58
49. Illegal dumping associated with urban sprawl and human traffic often occurs on edges. The pollution that results threatens human health, and reduces the aesthetic and ecological integrity of natural environments. 5	9
50. Type of pollution associated with urban-suburban sprawl. Some illegally dumped solid waste contains toxic materials that are introduced into the Watershed. ....	59

## PREFACE

This report covers tasks listed in Section IV, H, and I of ~~the~~ Memorandum of Agreement between Texas Parks and Wildlife Department (TPWD) and the U.S. Army Corps of Engineers (USCOE) for studies of the Big Cypress Bayou Watershed (Appendix A). The project time frame initially ~~was~~ April, 1994 ~~through~~ February, 1995. Field work began in June, 1994 immediately following administrative actions necessary to proceed. Subsequently, the completion date was extended through September, 1995. The overriding purpose of this reconnaissance was to comply with ~~prescriptions in~~ the proposal for Caddo Lake and the associated Watershed ~~that~~ call for assurance of the ecological integrity, traditional use options, information ~~to~~ aid long-range planning, and community involvement (Chapman-Texas Parks and Wildlife Department, 1993). Assurance of the Watershed's ecological integrity is taken herein as planning and management actions ~~to~~ optimize the ~~quality~~ and well-being of the living ~~natural~~ resources ~~over~~ the long-term. Living natural ~~resources~~ are ~~defined~~ as ~~native~~ plants and animals and ~~the~~ habitats on which they rely. ~~They~~ may sometimes be referred to as natural resources, ~~or~~ resources.